



# 2017 Spring Netting (SNI and SNII) Summary Report

## Cloverleaf Chain of Lakes

Shawano County (WBIC 299000)

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### Introduction and Survey Objectives

In 2017, the Department of Natural Resources conducted a fyke netting survey of the Cloverleaf Chain of Lakes in order to provide insight and direction for the future fisheries management of the water body. Primary sampling objectives of this survey are to characterize species composition, relative abundance and size structure. The following report is a brief summary of the activities conducted, general status of fish populations and future management options.

Acres: 316      Shoreline Miles: 5.15      Maximum Depth (feet): 52  
 Lake Type: Deep Headwater      Public Access: Two Public Boat Launches  
 Regulations: 25 panfish of any size may be kept, except 5 or fewer can be bluegill and pumpkinseed over 7". All other species statewide default regulations.

### WISCONSIN DNR CONTACT INFO.

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### Survey Information

Site location	Survey Dates	Water Temperature (°F)	Target Species	Gear	Number of Nets	Net Nights
Cloverleaf Chain	4/3/2017 - 4/14/2017	42 - 50	Northern Pike, Walleye, Muskellunge, Panfish	Fyke Net	9	85

### Survey Method

- The Cloverleaf Chain of Lakes was sampled according to spring netting (SNI and SNII) protocols as outlined in the statewide lake assessment protocol. The primary objective for this sampling period is to count and measure adult walleye and muskellunge. However, this survey can also be used to target adult northern pike. Other gamefish may be sampled but are considered by-catch as part of this survey.
- Fyke Nets were deployed in areas of the Cloverleaf Chain of Lakes that contained spawning habitat or were likely travel areas for northern pike, walleyes, or muskellunge. All newly captured northern pike and walleyes were given a partial fin clip (top caudal fin) to try to estimate population abundance using mark - recapture. All muskellunge were weighed and given a Passive Integrated Transponder (PIT) tag to track each individual. Age structures (i.e., otoliths) were collected from a subsample of bluegill and black crappie for age and growth analysis.
- Fish metrics used to describe fish populations include catch per unit effort, total abundance, proportional stock density, length frequency distribution, mean length at age, and mean age at length.



### Fish Metric Descriptions

**Catch per unit effort (CPUE) is an index used to measure fish population relative abundance**, which simply refers to the number of fish captured per unit of distance or time. For netting surveys, we typically quantify CPUE by the number and size of fish per net night. CPUE indexes are compared to statewide data by percentiles and within lake trends. For example, if a CPUE is in the 90th percentile, it is higher than 90% of the other CPUEs in the state.

**Total abundance is a metric that describes population size and is estimated by mark and recapture.** In our study, all northern pike that were captured were given a partial caudal fin (i.e., tail fin) clip and released. Each time the nets were checked, all northern pike were examined for a partial caudal fin clip. The number of previously captured individuals (i.e., fin clipped) was recorded and proportions of marked individuals to unmarked individuals was used to estimate the total abundance of the northern pike population.

**Proportional Stock Density (PSD) is an index used to describe size structure of fish populations.** It is calculated by dividing the number of quality size fish by the number of stock size fish for a given species. PSD values between 40 - 60 generally describe a balanced fish population.

**Length frequency distribution (LFD) is a graphical representation of the number or percentage of fish captured by half inch or one inch size intervals.** Smaller fish (or younger age classes) may not always be represented in the length frequency due to different habitat usage or sampling gear limitations.

**Mean Length at Age is an index used to assess fish growth.** Calcified structures (e.g., otoliths, spines, or scales) are collected from 5-10 individuals per half inch or one inch length bins. Age estimates from these fish are used to estimate mean lengths at ages for the population.

**Mean Age at Length** is an index used to assess fish growth. Growth structures (otoliths, spines, or scales) are collected from a specified length bin of interest (e.g., 7.0-7.5 inches for bluegill). Mean age is compared to statewide data by percentile with growth characterized by the following benchmarks: slow (<33rd percentile); moderate (33rd to 66th percentile); and fast (>66th percentile).

### Relative Abundance (Catch per Unit Effort)

Species	2017 Total Number Captured	CPUE (number per net night)			2017 Statewide Percentile Rank	2017 Abundance Rating
		2008	2013	2017		
BLACK CRAPPIE	662	35.6	22.6	7.8	69	Moderate - High
BLUEGILL	1,300	43.0	30.5	15.3	60	Moderate
BOWFIN	12	0.1	0.3	0.1	-	-
LARGEMOUTH BASS	20	1.6	1.1	0.2	10	Low
MUSKELLUNGE	42	1.8	0.6	0.5	55	Moderate
NORTHERN PIKE	109	3.0	2.5	1.3	45	Moderate
PUMPKINSEED	299	2.6	3.2	3.5	71	High
ROCK BASS	100	7.8	3.2	1.2	-	-
WALLEYE	17	0.3	0.1	0.2	8	Low
YELLOW PERCH	33	0.8	0.5	0.4	25	Low

# Cloverleaf Chain of Lakes (WBIC 299000) - Summary Report Continued

## Gamefish Summary

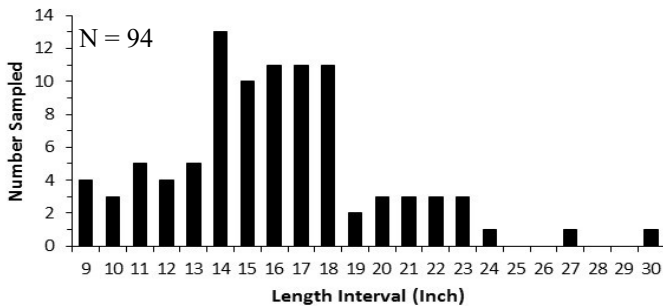
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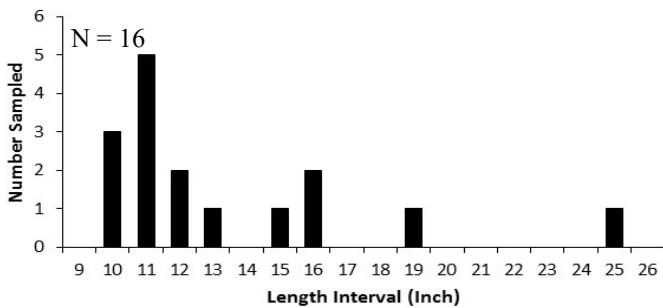
#### 2017 Size Structure Metrics

Species	Total	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock Number	Quality Number	PSD	Percentile Rank	Size Rating
NORTHERN PIKE	94	16.6	9.5 - 31.0	14.0 and 21.0	73	12	16	13	Low
WALLEYE	16	13.8	10.6 - 25.8	10.0 and 15.0	16	5	31	18	Low
MUSKELLUNGE	34	39.7	33.3 - 47.4	30.0 and 34.0	34	33	97	97	High
LARGEMOUTH BASS	20	9.2	5.8 - 16.5	8.0 and 12.0	8	4	50	56	Low

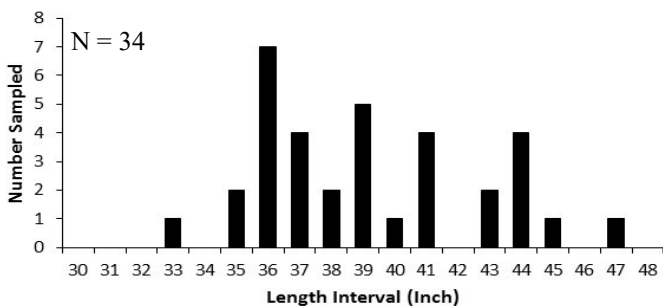
Northern Pike Length Frequency



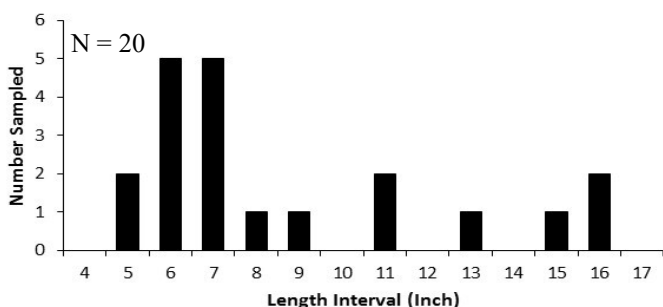
Walleye Length Frequency



Muskellunge Length Frequency



Largemouth Bass Length Frequency



#### Size Structure (PSD) Trends

Species	Historical Median (1980-Present)	PSD by Year							
		1980	1985	1988	1994	2000	2008	2013	2017
NORTHERN PIKE	8	6	6	5	4	10	18	10	16
WALLEYE	96	95	91	80	97	100	100	100	31
MUSKELLUNGE	75	46	83	68	74	74	75	81	97
LARGEMOUTH BASS	60	74	59	56	61	72	56	63	50

#### 2017 Total Adult Abundance (Mark and Recapture Population Estimate)

Species	Number Marked (Netting)	Number Sampling Events (Netting)	Number Recaptures (Netting)	Schnabel Population Estimate (95%)	Number per Acre	Abundance Rating
NORTHERN PIKE	85	11	13	268 (170 - 629)	0.85	Low

## Gamefish Summary

### Northern Pike

- Northern pike were found in low to moderate densities with a population dominated by smaller individuals, including several immature individuals. Two stockings of large fingerling northern pike took place in 2014 and 2017 to try to increase densities.
- Limited habitat and high harvest are likely factors contributing to the small size structure. Historically, the northern pike population has been comprised of mostly small individuals as seen by the low PSD values through time.

### Walleye

- Walleye were also found in low densities with a population dominated by smaller individuals. Only two walleyes >17 inches were captured. It is likely that the walleyes between 10 - 17 inches are from the 2013 and 2015 stocking events, making them 2 or 4 years old at the time of netting. No walleyes were stocked between 2009 and 2012, which likely explains why few large walleyes were caught in 2017 netting.
- Despite a history of walleye stocking going back to the 1980s, walleye population densities in the Cloverleaf Chain have remained low. Low densities are typical of lakes that do not have natural reproduction and are supported solely through stocking. Habitat in these lakes are not ideal for walleyes and therefore population numbers remain low regardless of stocking effort.

### Muskellunge

- The Cloverleaf Chain supports a moderate density of large muskies. Despite being classified as a Class B musky fishery, size structure and growth potential of muskies are closer to that of a Class A fishery.
- Stocking will be necessary to sustain a musky fishery in the future.

### Largemouth Bass

- Largemouth bass were found at low densities with a small to moderate size structure. However, electrofishing is the more preferred gear for evaluating the largemouth bass population. An electrofishing survey was also conducted in spring, 2017. Results from that survey can be found in a separate report.

# Cloverleaf Chain of Lakes (WBIC 299000) - Summary Report Continued

## Panfish Summary

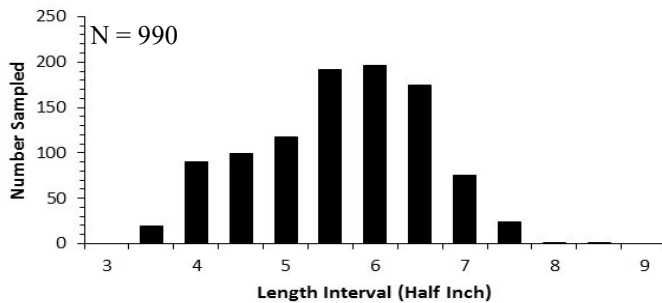
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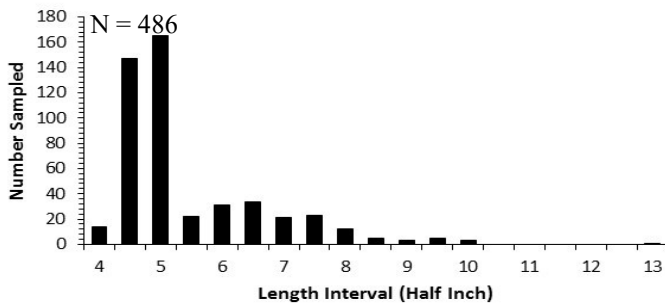
#### 2017 Size Structure Metrics

Species	Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Sizes (inches)	Stock Number	Quality Number	PSD	Percentile Rank	Size Rating
BLUEGILL	990	5.8	3.6 - 8.6	3.0 and 6.0	990	472	48	42	Moderate
BLACK CRAPPIE	486	5.7	4.2 - 13.2	5.0 and 8.0	325	29	9	5	Low
PUMPKINSEED	276	5.2	3.2 - 7.4	3.0 and 6.0	276	58	21	25	Low
YELLOW PERCH	33	6.3	4.6 - 8.8	5.0 and 8.0	27	4	15	50	Moderate

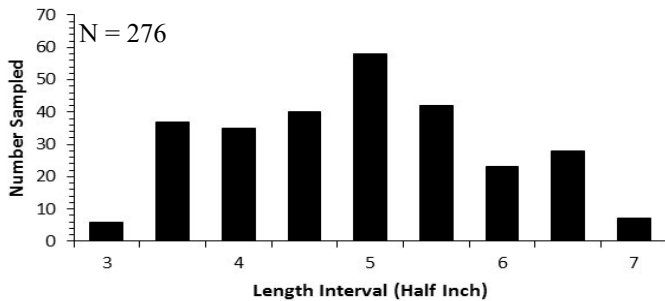
Bluegill Length Frequency



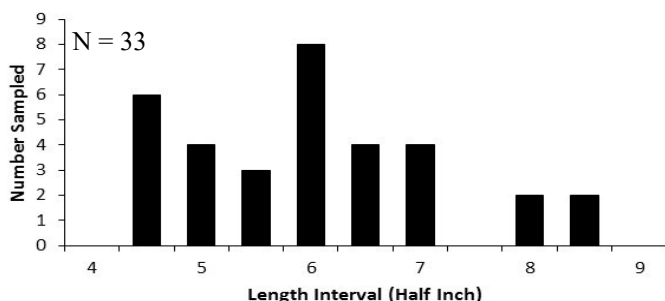
Black Crappie Length Frequency



Pumpkinseed Length Frequency



Yellow Perch Length Frequency



#### Size Structure (PSD) Trends

Species	Historical Median (1980-Present)	PSD by Year						
		1980	1985	1994	2000	2008	2013	2017
BLUEGILL	53	53	55	66	63	42	39	48
BLACK CRAPPIE	45	50	58	56	31	14	45	9
PUMPKINSEED	25	56	32	48	25	24	16	21
YELLOW PERCH	15	-	0	20	14	17	3	15

#### Growth Metrics

Species	Total (N)	Length Bin (inches)	Mean Age (years)	Age Range (years)	Percentile Rank	Growth Rating
BLUEGILL	34	5.5 - 6.4	5.3	4 - 6	39	Slow - Moderate
BLUEGILL	30	6.5 - 7.4	5.8	4 - 7	34	Slow - Moderate
BLACK CRAPPIE	8	7.5 - 8.4	4.1	4 - 5	48	Moderate
BLACK CRAPPIE	3	8.5 - 9.4	6.7	4 - 8	7	Slow

## Panfish Summary

### Bluegill

- Bluegill densities and size structure in 2017 were found at moderate levels. Bluegill relative abundance in 2017 was lower than what was observed in 2008 or 2013 whereas size structure in 2017 was higher than what was observed in 2008 or 2013.
- The majority of individuals captured in 2017 were between 5 - 7 inches with very few individuals >8 inches captured. Growth is still slow-moderate, likely due to the density of individuals in the population.

### Black Crappie

- Black crappie were found at moderate - high densities in 2017, but densities were lower than densities observed in 2008 or 2013.
- Few black crappies >8.0 inches were captured and growth of the individuals between 7.5 - 9.5 inches was slow to moderate.
- There was a very strong year class of black crappies between 4.5 - 6 inches (likely two years old). This year class should provide a nice fishery once they grow to be harvestable size in the next couple of years.

### Pumpkinseed

- Pumpkinseed densities remained high in 2017 and were only slightly higher than what was observed in the previous two fyke netting surveys. Size structure continues to be dominated by individuals 4 - 6 inches. No pumpkinseed over 7.5 inches were captured.

### Yellow Perch

- Yellow perch densities continue to remain low with a population dominated by individuals 5 - 7 inches long. No yellow perch > 9.0 inches were captured.

# Cloverleaf Chain of Lakes (WBIC 299000) - Summary Report Continued

## Stocking History and Management Options

### Shawano County

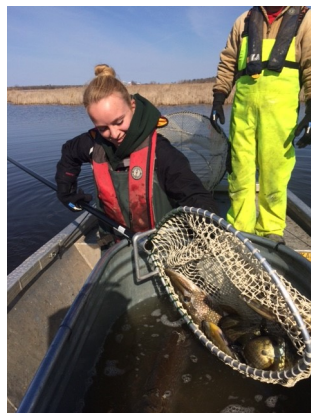
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#### Stocking History 1972 - Present

Species	Year	Age	Mean Length (inches)	Number Stocked
WALLEYE	2017	LARGE FINGERLING	3.3	3,172
NORTHERN PIKE	2017	LARGE FINGERLING	8.5	900
MUSKELLUNGE	2017	LARGE FINGERLING	12.0	316
WALLEYE	2015	LARGE FINGERLING	7.8	3,184
WALLEYE	2015	LARGE FINGERLING	7.0	2,100
MUSKELLUNGE	2014	LARGE FINGERLING	9.8	316
NORTHERN PIKE	2014	LARGE FINGERLING	9.5	796
WALLEYE	2013	LARGE FINGERLING	6.8	6,338
MUSKELLUNGE	2010	LARGE FINGERLING	13.2	193
MUSKELLUNGE	2008	LARGE FINGERLING	10.3	640
WALLEYE	2008	SMALL FINGERLING	1.5	11,290
MUSKELLUNGE	2006	LARGE FINGERLING	10.8	140
MUSKELLUNGE	2006	LARGE FINGERLING	13.0	200
WALLEYE	2006	SMALL FINGERLING	1.4	15,985
MUSKELLUNGE	2004	LARGE FINGERLING	10.5	638
WALLEYE	2004	SMALL FINGERLING	1.4	15,990
MUSKELLUNGE	2002	LARGE FINGERLING	10.1	640
MUSKELLUNGE	2000	LARGE FINGERLING	11.4	450
WALLEYE	2000	SMALL FINGERLING	1.7	11,000
WALLEYE	1998	SMALL FINGERLING	1.7	8,850
WALLEYE	1997	LARGE FINGERLING	2.7	11,000
WALLEYE	1996	FINGERLING	1.6	14,954
WALLEYE	1994	FINGERLING	3.6	16,303
MUSKELLUNGE	1992	FINGERLING	11.0	646
WALLEYE	1992	FINGERLING	3.0	8,120
MUSKELLUNGE	1991	FINGERLING	10.9	640
WALLEYE	1989	YEARLING	10.0	4,500
MUSKELLUNGE	1989	FINGERLING	11.0	640
WALLEYE	1987	FINGERLING	7.0	33,150
MUSKELLUNGE	1987	FINGERLING	9.0	1,920
WALLEYE	1985	FINGERLING	2.0	14,100
MUSKELLUNGE	1985	FINGERLING	12.0	840

#### Mean Length (inches) at Age

Age	Bluegill	Black Crappie
1	-	-
2	3.8	5.0
3	4.6	6.4
4	5.5	7.6
5	6.5	8.8
6	6.8	-
7	7.2	-
8	-	9.2
9	7.8	-



### Management Options

#### Northern Pike

- Northern pike were found in low densities with few individuals >24 inches captured.
- Stockings of large fingerling northern pike took place in 2014 and 2017 to try to increase densities.
- A special regulation may protect some northern pike from harvest and improve size structure. However, limited habitat will likely result in limited success of any special regulations.
- Increasing northern pike habitat by promoting moderate densities of native aquatic plants throughout the littoral zone of all lakes will increase densities and growth and result in a more desirable northern pike fishery.



#### Walleye

- Walleye were found in low abundance with few large fish in the population.
- Stocking at a rate of 5 -10 large fingerlings per acre every 2 - 3 years will be necessary to continue to have low density put - grow - and take walleye fishery in the future.

#### Muskellunge

- Despite being a small water body, the Cloverleaf Chain of Lakes supports a moderate density of large muskellunge.
- Continue stocking at a rate one musky per acre every 2 - 3 years to maintain the musky population at its current level.

#### Largemouth Bass

- Maintain density and size structure observed in fyke netting and electrofishing surveys. A higher density of largemouth bass will help reduce the density of panfish. No management recommendation at this time.

#### Panfish

- Bluegill, black crappie, and yellow perch densities were lower in 2017 than in either of the two previous fyke netting surveys, whereas bluegill size structure was slightly higher in 2017 compared to the fyke netting surveys in 2008 and 2013.
- Maintaining higher densities of predators to keep panfish densities lower will result in less competition among panfish for resources. This will result in faster growth rates and larger panfish. Continue to stock predators as necessary to maintain adequate numbers of predatory fish.
- The special regulation put in place in 2016 will also hopefully help reduce the density of smaller bluegill and pumpkinseed by increasing harvest of individuals <7 inches. The regulation will also hopefully protect some of the larger bluegill and pumpkinseed from harvest. It is still too early to see any significant effects of this regulation.
- Reduced densities and faster growth rates combined with the special panfish regulation will hopefully result in a really good panfish fishery in the next couple of years.

#### Other Management Objectives

- Habitat is likely a limiting factor in the Cloverleaf Chain of Lakes. The majority of the shoreline is developed resulting in very little coarse woody habitat within the lakes. Furthermore, the littoral zones of Round and Grass Lakes are narrow in places due to steep lake bottoms. Areas for expansion of littoral zone fish sticks along with deep water fish sticks should be considered to increase habitat complexity within the lakes. Furthermore, critical habitat areas designated in 2004 should be preserved to prevent any future habitat loss within the Cloverleaf Chain of Lakes.
- The Cloverleaf Chain of Lakes is due for another comprehensive survey in 2021. This survey will provide better insight on the effects of walleye and northern pike stockings as well as the effects of the special panfish regulation.

